

REMARKS

Claims 1-22 are pending in this application. By this Amendment, claims 1 and 12 are amended. The amendments introduce no new matter because they (1) are supported by at least Applicants' disclosure at paragraphs [0044], [0050] and [0099], or (2) are made to correct an informality Applicants discovered in preparing this response. Reconsideration of the application based on the above amendments and the following remarks is respectfully requested.

The Office Action, on page 3, indicates that claims 11-14 and 20 recite allowable subject matter. Specifically, these claims are indicated as allowable if rewritten in independent form including all of the features of the base claim and any intervening claims. Applicants appreciate this indication of allowability, but respectfully submit that at least independent claims 1 and 16, from which these claims respectively depend, are allowable for at least the reasons set forth below.

The Office Action, on page 2, rejects claims 1-3 under 35 U.S.C. §102(b) as being anticipated by JP-A-08-093547 (hereinafter "JP '547") or JP-A-04-311656 (hereinafter "JP '656"). The Office Action, on page 2, rejects claims 4-10, 15-19 and what Applicants understand to be claim 21 under 35 U.S.C. §103(a) as being unpatentable over JP '547 in view of the article "Dynamics of Mechanism" (hereinafter "the Kubota article"). The Office Action, on page 3, rejects claim 22 under 35 U.S.C. §103(a) as being unpatentable over JP '547 in view of U.S. Patent No. 6,543,229 to Johansson. These rejections are respectfully traversed.

With respect to the rejections of independent claims 1, 16 and 17, separately as enumerated above, the Office Action broadly paraphrases Applicants' claim language and then asserts that, simply because one or the other of the applied primary references discloses a stirling engine, the combinations of all of the features positively recited in independent claims

1, 16 and 17 are anticipated, or at least would have been suggested, by the primary references, in combination with the Kubota article, as appropriate. The analysis of the Office Action with regard to the §102 rejections fails for at least the following reasons.

Claim 1 recites, among other features, wherein an exhaust system of an internal combustion engine provides a heat source for the stirling engine, and the gas bearing supports the piston without contact by means of pressure of distributed gas. To any extent that simply because the two Japanese references disclose stirling engines, and they can be considered to render anticipated certain general aspects of a stirling engine, neither of these references specifically teaches at least this combination of recited features.

As is carefully explained throughout Applicants' disclosure, including in the above-cited paragraphs, the stirling engine that is the subject matter of the pending claims, in its use of an exhaust system of an internal combustion engine as its heat source, operates in an environment where the obtainable quantity of heat from the particularly recited heat source is limited. As a result, the stirling engine that is the subject matter of the pending claims must include structural features designed to minimize internal friction inside the stirling engine to allow the stirling engine to perform. It is for this reason that, as positively recited in the pending claims, a gas bearing is used to keep an air-tight condition between the piston and the cylinder. Specifically, as is recited in the pending claims, the gas bearing that supports the piston does so without contact by means of pressure of distributed gas. In this regard resistance to side forces must also be minimized to support the non-contact. It is for this additional reason that highly accurate motion provided by the recited linear approximation mechanisms must be maintained to ensure, to the maximum extent possible, linear motion of the piston relative to the lateral axis of the cylinder. This combination of features, and the objectives met by this combination of features, is not disclosed, nor recognized, by any combination of the applied references. For at least the foregoing reasons, the combination of

all of the features positively recited in independent claim 1 cannot reasonably be considered to be taught, or to have been suggested, by either of JP '547 or JP '656. Additionally, claims 2 and 3 are neither taught, nor would they have been suggested, by these references for at least the respective dependence of these claims on an allowable base claim, as well as for the separately patentable subject matter that each of these claims recites.

Accordingly, reconsideration and withdrawal of the rejections of claims 1-3 under 35 U.S.C. §102(b) as being anticipated by JP '547 or JP '656 are respectfully requested.

With regard to the rejections of the other pending claims under 35 U.S.C. §103(a), claims 16 and 17 are allowable because the application of the Kubota article does not overcome the above-identified shortfall in the application of JP '547 to the subject matter of these claims. Further, the rest of the enumerated claims at the bottom of page 5 are allowable for at least the respective dependence of these claims on allowable base claims, as well as for the separately patentable subject matter that each of these claims recites. Claim 22 is allowable because Johansson is not applied in a manner that would overcome the above-identified shortfall in the application of JP '547 to the subject matter of claim 17 from which claim 22 indirectly depends. Even with the application of Johansson showing an internal combustion engine as a heat source, the specifics of the gas bearing seal are not disclosed in any combination of these references.

It should also be noted that the Office Action indicates that JP '547 fails to disclose different types of linear approximation devices. Rather, the Office Action relies on the Kubota article in disclosing many linear approximation devices and concludes that it would have been obvious to select different types of linear approximation devices in the stirling engine of JP '547 for the purpose of producing the same linear motion. This particular analysis of the Office Action fails for at least the following reasons.

The proper standard by which to determine obviousness requires (1) that the Examiner step backward in time into the shoes of the hypothetical "person of ordinary skill in the art," (2) that "[i]n view of all of the factual information, the Examiner must then make a determination whether the claimed invention 'as a whole' would have been obvious at the time to that person," and (3) that any knowledge gained from Applicants' disclosure must be put aside at reaching this determination in order to avoid a tendency to resort to the impermissible application of hindsight reasoning based on the road map provided by Applicants' disclosure. Clearly, there is nothing in either of the primarily-applied Japanese references that would lead one to suggest that there is any predictable reason by which one of ordinary skill would have complicated those simple designs with the varying mechanisms disclosed in the Kubota article in the manner suggested by the Office Action with any reasonable expectation of success. Additionally, other than the bare conclusory statement that such a combination would have been made, no objective evidence of record has been presented to support such a conclusion. Even post-*KSR*, the analysis supporting an obviousness rejection must be explicit. The U.S. Supreme Court in *KSR* approved the conclusions set forth in the decision of the Federal Circuit in *In re Kahn* (citations omitted) that "rejections on obviousness grounds cannot be sustained with mere conclusory statements; instead there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." This standard is not met here with the conclusory statement that one of ordinary skill in the art simply would have combined these references in the manner suggested. In other words, there is no rational underpinning to support the articulated reasoning set forth in the Office Action to make the asserted combination.

Additionally, the post-*KSR* guidance is explicit in setting forth exemplary rationales to guide the obviousness analysis in supporting a rejection under 35 U.S.C. §103 in light of the Supreme Court's decision. The mandate of this guidance is that "[t]he key to supporting any

rejection under 35 U.S.C. §103 is the clear articulation of the reason(s) why the claimed invention would have been obvious." The paraphrase of Applicants' claim language and the broad conclusory statements set forth in the Office Action do not appear to meet this standard either. Certainly there is not even an attempt by the Office Action to frame the asserted obviousness rejection over this combination of applied references under any of the exemplary rationales set forth in the Patent Office's guidance.

Accordingly, reconsideration and withdrawal of the rejections of claims 4-10, 15-19, 21 and 22 under 35 U.S.C. §103(a) as being unpatentable over any of the asserted combinations of applied references are respectfully requested.

In view of the foregoing, Applicants respectfully submit that this application is in condition for allowance. Favorable reconsideration and prompt allowance of claims 1-10, 15-19 and 21, in addition to the indicated allowable subject matter of claims 11-14 and 20, are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact Applicants' undersigned representative at the telephone number set forth below.

Respectfully submitted,

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JAO:DAT/cfr

Attachment:

Petition for Extension of Time

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